INTERNAL WORKING DOCUMENT

Incidence of Rabbit (snowshoe hare) Damage In Plantations In New Brunswick

No. 86-01

ABSTRACT

Incidence of damage to planted trees was found to range as high as fifty-seven (57) percent for an individual species. Damage province-wide averaged six (6) percent for the three study years.

White spruce appears to be the species most favoured with jack pine following closely second. The percentage of damage was highest during the 1981-82 and 1982-83 seasons.

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JANUARY 1986

INTRODUCTION

Seven hundred and twenty-one (721) Crown land plantations were surveyed for the incidence of rabbit (snowshoe hare) browse damage. The survey was conducted as part of the annual survival and development assessments undertaken between 1982 and 1984. These assessments were carried out one, three and five years after planting.

Survival assessment sampling consisted of five (5) meter radius (78.5 m^2) plots sampled at an intensity of one (1) plot for every ten (10) to twenty (20) hectares of plantations. In this case six hundred and forty (640) plantations were sampled.

Development assessment plots were eight (8) meters in radius (200 m^2) and sampled at an intensity as high as one (1) plot per two (2) hectares in eighty-one (81) plantations.

The data for the three (3) study years was compiled following the 1984 survival and development assessment.

Results

Researchers have reported that the amount of browsing or browse damage can be related to animal numbers. Figure 1 shows the estimated number of rabbits reported taken by trappers between 1980 and 1985. This figure suggests that a population peak was reached during the 1980-83 seasons with the population decreasing gradually through the 1984-85 season. Table 1 supports the population observation showing an increase in browse damage (in percent) through 1982--peaking in 1983; and starting to decrease in 1984.

It was not possible to determine a total browsing calculation because the exact reason planted trees were missing was not clearly established. As a result rabbit damage estimates tend to be low as the actual cause of tree damage or mortality was not reported.

Reports indicate that most browse damage occurs within the first three (3) years after establishment. Province-wide figures in Tables 1 and 2 tend to support this observation. Damage was highest in third year plantations with highest averages ranging from twelve (12) to fourteen (14) percent for the three study years. First year damage was slightly lower with highest averages

ranging from eleven (11) to twelve (12) percent (for the same period) with jack pine being preferred. No comparisons were made with the fifth year figures because of lack of continuity between third and fifth year measurements (different plots) and insufficient data.

Incidence of browse damage tabulated by species, Forest Administration Regions and Stock Type are presented in Table 2. Overall damage was highest in Region 5 closely followed by Regions 4 and 3. Species susceptability on a province-wide basis indicated that red pine was most favoured with white spruce, jack pine and black spruce following in order. In this survey red pine is ignored due to an extremely small number of trees in the sample. In general it would appear that browsing animals (rabbits) tend to favour jack pine paperpots over most other species and stock type combinations with the exception of white spruce which exhibited the most damage overall.

Table 3 illustrates the percentage of browse damage by stock type and site preparation method tabulated according to the year measured. It is difficult to draw concrete results from the data but there is an indication that most damage occurs on sites prepared by disc trencher, finnish plow and C&H plow. This is more clearly illustrated in Table 4. It is also evident that most damage occurred during the 1982-83 season as indicated earlier.

Recommendations

In the event that additional investigations are undertaken in the future, the following should be considered.

1) What type of browse damage is detrimental to the growth of the planted tree. eg. Does the browsing of only a few lateral branches have a long term effect at rotation?

2. Mortality recorded during survival assessments has not always been attributed to a particular cause -- i.e. the causal agency should be determined and recorded.

3. Only live trees are examined for incidence of damage--dead trees should also be checked.

4. To determine tree development over time (with regard to browse damage) the same plots must be re-assessed to ensure continuity.

Conclusions

Only certain trends are evident from the data collected. It is apparent, however, that rabbit browse damage in plantations in New Brunswick is a cause for concern.

1. Damage province-wide averaged six (6) percent for the three study years.

2. White spruce is the favoured species with jack pine being a close second.

3. The greatest amount of browse damage occurred between 1981 and 1983.

4. Most damage occurs within the first 3 years following establishment.

5. Site preparation methods using a plow format (furroughs) should be avoided where high rabbit populations are expected.

Table 1 - Comparison of Incidence of Browse Damage (% of Total Number Live Trees)

(Damage expressed as % by stock type - based on year assessed)

		REGION															PROVINCE		
Measured 1984		1			2			3			4			5					
Established	Assessed	BR[1]	PP[2]	TOT	BR	PP	TOT	BR	PP	TOT	BR	PP	TOT	BR	PP	TOT	BR	PP	TOT
1983	1st YR	3	1	1	3	2	2	2	0	1	0	4	2	0	11	11	1	3	2
1981	3rd YR	4	3	3	1	3	2	12	4	5	28	4	13	6	4	4	11	3	6
1979	5th YR	- - - - - - - - - - - - - - - - INSUFFICIENT DATA - - - - - - - - - - - - - - - -																	
	AVERAGE	4	2	2	1	2	2	7	3	4	17	4	9	6	6	6	8	3	5
Measured 1983																			
1982	1st YR	7	7	6	1	1	1	1	2	1	13	5	8	1	15	11	5	5	5
1980	3rd YR	10	8	9	11	1	7	4	2	3	15	2	7	10	16	14	10	5	7
1978	5th YR	5	9	9	20	-	20	12	24	20	24	0	23	-	13	13	18	17	17
	AVERAGE	9	8	8	11	1	7	5	5	5	16	3	8	8	16	14	10	6	8
Measured 1982																			
1981	1st YR	4	2	3	0	5	4	10	13	12	4	11	9	3	4	4	4	7	7
1979	3rd YR	3	6	5	1	1	1	7	6	7	6	16	12	14	8	10	4	6	5
1977	5th YR	0	8	6	-	1	1	-	2	2	0	2	2	50	5	20	15	3	5
	AVERAGE	3	6	5	1	2	1	8	8	8	4	11	9	13	6	8	5	6	6

[1]Bare Root Stock [2]Paper Pot Stock

NOTE: Spencer Lemaire & Styroblock not included due to low number of samples.

Table 2. INCIDENCE OF BROWSE DAMAGE BY FOREST ADMINISTRATION REGION, SPECIES AND STOCK TYPE
(Damage expressed as per cent of live trees)

Plantation Established	Assessed	Region	Jack Pine				Black Spruce				White Spruce		Larch		Red Pine	White Pine	TOTAL
			BR[1]	PP[2]	SB[3]	SL[4]	BR	PP	SB	SL	BR	PP	BR	PP	BR	BR	
		1	3	2	-	-	4	3	-	-	<1	-	-	-	-	-	3
		2	-	6	-	-	0	5	-	-	-	0	-	-	-	-	4
1981	1982	3	0	20	-	-	17	7	-	-	6	-	-	-	-	-	12
	(1st Yr)	4	-	17	-	-	<1	13	-	-	5	9	-	0	6	-	9
		5	-	0	-	-	-	4	-	-	3	-	-	0	-	-	4
		Prov.	3	11	-	-	5	5	-	-	4	7	-	0	6	-	7
		1	1	7	-	-	4	4	-	-	2	10	-	0	-	-	5
		2	0	<1	-	-	0	<1	-	-	-	<1	-	-	<1	-	<1
1979	1982	3	6	6	-	-	4	7	-	-	51	5	-	-	2	-	7
	(3rd Yr)	4	4	-	-	-	11	16	0	-	0	24	-	-	5	-	12
		5	-	20	-	-	5	9	-	-	19	3	-	-	-	-	10
		Prov.	2	6	-	-	3	8	0	-	22	3	-	0	3	-	5
		1	0	8	-	-	-	7	-	-	-	-	-	-	-	-	6
		2	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	0
1977	1982	3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2
	(5th Yr)	4	0	2	-	-	-	0	-	-	-	-	-	-	-	-	2
		5	-	-	-	-	-	7	-	-	50	0	-	-	-	-	20
		Prov.	0	4	-	-	-	5	-	-	50	0	-	-	-	-	5
		1	0	12	-	-	7	4	-	-	-	0	-	0	-	-	6
		2	0	3	-	-	<1	<1	-	-	0	-	-	-	<1	-	1
1982	1983	3	0	<1	6	-	2	3	-	-	0	-	-	-	-	-	1
	(1st Yr)	4	36	4	0	-	8	8	0	-	2	0	-	-	12	-	7
		5	-	-	-	-	<1	5	0	-	3	14	-	-	-	-	11
		Prov.	29	5	6	-	3	6	0	-	2	8	-	0	9	-	5
		1	12	8	-	-	7	13	-	-	9	4	-	2	0	-	9
		2	12	0	-	-	-	<1	-	-	0	<1	-	-	23	-	7
1980	1983	3	4	3	-	-	15	<1	0	-	1	0	-	-	3	-	3
	(3rd Yr)	4	0	3	-	-	<1	2	0	-	41	<1	-	-	15	-	6
		5	-	-	-	-	7	13	-	-	11	24	-	-	-	-	14
		Prov.	10	5	-	-	6	5	0	-	10	9	-	2	13	-	7
		1	0	0	-	-	5	13	57	-	-	-	-	-	-	-	15
		2	20	-	-	-	-	-	-	-	-	-	-	-	-	-	20
1978	1983	3	7	27	-	-	15	3	-	-	45	-	-	-	-	-	20
	(5th Yr)	4	43	-	-	-	-	0	2	-	-	-	-	-	16	-	17
		5	-	-	-	-	-	4	-	-	-	22	-	-	-	-	13
		Prov.	19	22	-	-	14	8	22	-	45	22	-	-	16	-	17
		1	10	1	-	0	0	<1	-	-	-	<1	-	0	-	-	<1
		2	5	3	4	-	<1	<1	-	7	-	-	-	-	5	-	2
1983	1984	3	3	0	4	-	<1	0	-	-	-	-	0	-	-	0	1
	(1st Yr)	4	0	4	-	-	0	4	-	-	0	-	-	-	-	-	2
		5	-	-	-	-	0	11	-	-	-	-	-	-	-	-	11
		Prov.	4	2	4	0	<1	3	-	7	0	<1	0	0	5	0	2
		1	1	6	-	-	4	<1	-	-	<1	-	-	-	-	-	3
		2	-	5	-	-	<1	<1	-	-	-	<1	-	-	-	-	2
1981	1984	3	-	9	-	-	17	1	-	-	6	20	-	-	-	-	5
	(3rd Yr)	4	-	5	-	-	27	5	-	-	33	3	-	0	22	-	13
		5	-	29	-	-	-	3	-	-	6	-	-	-	-	-	4
		Prov.	1	6	-	-	8	2	-	-	16	5	-	1	22	-	6
		1															
		2															
1979	1984	3					I N S U F F I C I E N T D A T A										
	(5th Yr)	4															
		5															
		Prov.															

[1]Bare Root Stock [2]Paper Pot Stock [3]Styroblock [4]Spencer Lemaire

TABLE 3 - INCIDENCE OF BROWSE DAMAGE BY PER CENT DAMAGE FOR STOCK TYPE AND SITE PREPARATION METHOD--ASSESSED 1982, 1983, 1984

PLANTATION ESTABLISHED	STOCK TYPE	SITE PREPARATION METHOD (SCARIFICATION CODE)[1]																						
		1	2	3	4	5	6	7	8	60	61	62	63	64	80	81	82	83	84	85	86	87	88	98	99
ASSESSED 1982																									
	BR	2	<1	13	4	0	-	-	7	-	-	-	-	-	-	0	2	-	<1	0	-	-	-	-	0
1981	PP	4	8	0	11	2	-	-	-	-	-	-	-	-	7	<1	5	-	5	6	-	-	-	-	0
(1st YR)	BOTH	3	5	13	9	1	-	-	7	-	-	-	-	-	7	<1	4	-	1	5	-	-	-	-	0
	BR	11	16	<1	<1	14	0	-	-	-	-	-	-	-	<1	-	-	0	-	2	-	-	-	0	1
1979	PP	10	9	4	-	6	<1	-	-	-	-	-	-	-	<1	3	8	<1	-	<1	-	-	-	-	6
(3rd YR)	BOTH	10	11	2	<1	10	<1	-	-	-	-	-	-	-	<1	3	8	<1	-	<1	-	-	-	0	4
	BR	0	0	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1977	PP	4	3	7	-	0	0	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(5th YR)	BOTH	3	2	7	-	0	0	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASSESSED 1983																									
	BR	10	12	-	3	-	0	-	-	-	-	-	-	-	0	7	3	-	5	-	-	-	-	-	-
1982	PP	3	16	-	6	-	0	-	-	-	-	6	-	-	<1	<1	6	-	1	-	-	-	-	-	0
(1st YR)	BOTH	5	15	-	5	-	0	-	-	-	-	6	-	-	<1	4	6	-	3	-	-	-	-	-	0
	BR	5	16	13	6	8	-	-	10	-	-	-	-	-	8	-	0	5	-	<1	-	-	-	-	7
1980	PP	4	14	6	3	11	0	-	30	1	-	-	6	4	6	4	11	63	-	2	0	-	10	-	3
(3rd YR)	BOTH	4	15	12	4	10	0	-	19	1	-	-	6	4	6	4	1	11	-	1	0	-	10	-	5
	BR	10	22	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1978	PP	17	2	13	-	6	-	1	13	-	-	-	-	-	46	-	-	-	-	-	-	-	-	-	-
(5th YR)	BOTH	11	15	12	-	6	-	1	13	-	-	-	-	-	46	-	-	-	-	-	-	-	-	-	-
ASSESSED 1984																									
	BR	0	-	1	6	0	<1	2	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	0
1983	PP	1	1	3	5	5	<1	4	-	-	0	-	-	-	0	-	1	-	3	-	<1	0	-	0	0
(1st YR)	BOTH	<1	1	2	5	4	<1	3	-	-	0	-	-	-	0	-	1	-	3	-	<1	0	-	0	0
	BR	1	7	15	15	13	-	-	6	-	-	-	-	0	-	0	2	-	0	0	-	-	-	-	0
1981	PP	5	<1	0	3	1	-	-	-	-	-	-	-	<1	5	6	0	-	0	2	-	-	-	-	1
(3rd YR)	BOTH	4	3	15	6	3	-	-	6	-	-	-	-	<1	5	4	<1	-	0	2	-	-	-	-	<1
	BR																								
1979	PP																								
(5th YR)	BOTH	INSUFFICIENT DATA																							

[1] For detail see Appendix

TABLE 4 - PERCENT OF BROWSE DAMAGE BY SITE PREPARATION METHOD AND ASSESSMENT YEAR.

	1st YEAR				3rd YEAR				5th YEAR			
	1981	1982	1983	Avg.	1979	1980	1981	Avg.	1977	1978	1979	Avg.
BARRELS (01)	3	5	1	3	10	4	4	6	3	11	-	7
DISC TRENCHER (02)	5	15	1	7	11	15	3	10	2	15	-	8
FINNISH PLOW (03)	13	-	2	5	2	12	15	10	7	12	-	10
C & H PLOW (04)	9	5	5	6	1	4	6	3	-	-	-	-
BRACKE (05)	1	-	4	2	10	10	3	8	0	6	-	3
CRUSHER (06)	-	0	1	1	1	0	-	1	0	-	-	0
ROLLER (07)	-	-	3	1	-	-	-	-	-	1	-	1
ROOT RAKE (08)	7	-	-	2	-	19	6	8	20	13	-	16
BURN (80)	7	1	0	3	1	6	5	4	-	46	-	23
BURN + BARRELS (81)	1	4	-	1	3	4	4	4	-	-	-	-
BURN & TRENCHER (82)	4	6	1	4	8	1	1	3	-	-	-	-
BURN + FINNISH (83)	-	-	-	-	1	11	-	4	-	-	-	-
BURN + C & H (84)	1	3	3	2	-	-	0	0	-	-	-	-
BURN + BRACKE (85)	5	-	-	2	1	1	2	1	-	-	-	-
BURN + RAKE (88)	-	-	-	-	-	10	-	3	-	-	-	-

NOTE: HERBICIDE (60) AND VARIOUS SCARIFICATION METHOD COMBINATIONS ARE OMITTED DUE TO LOW NUMBERS (SEE TABLE 3).

* AVERAGES BASED ON ONLY TWO ASSESSMENT YEARS BECAUSE OF INSUFFICIENT DATA.

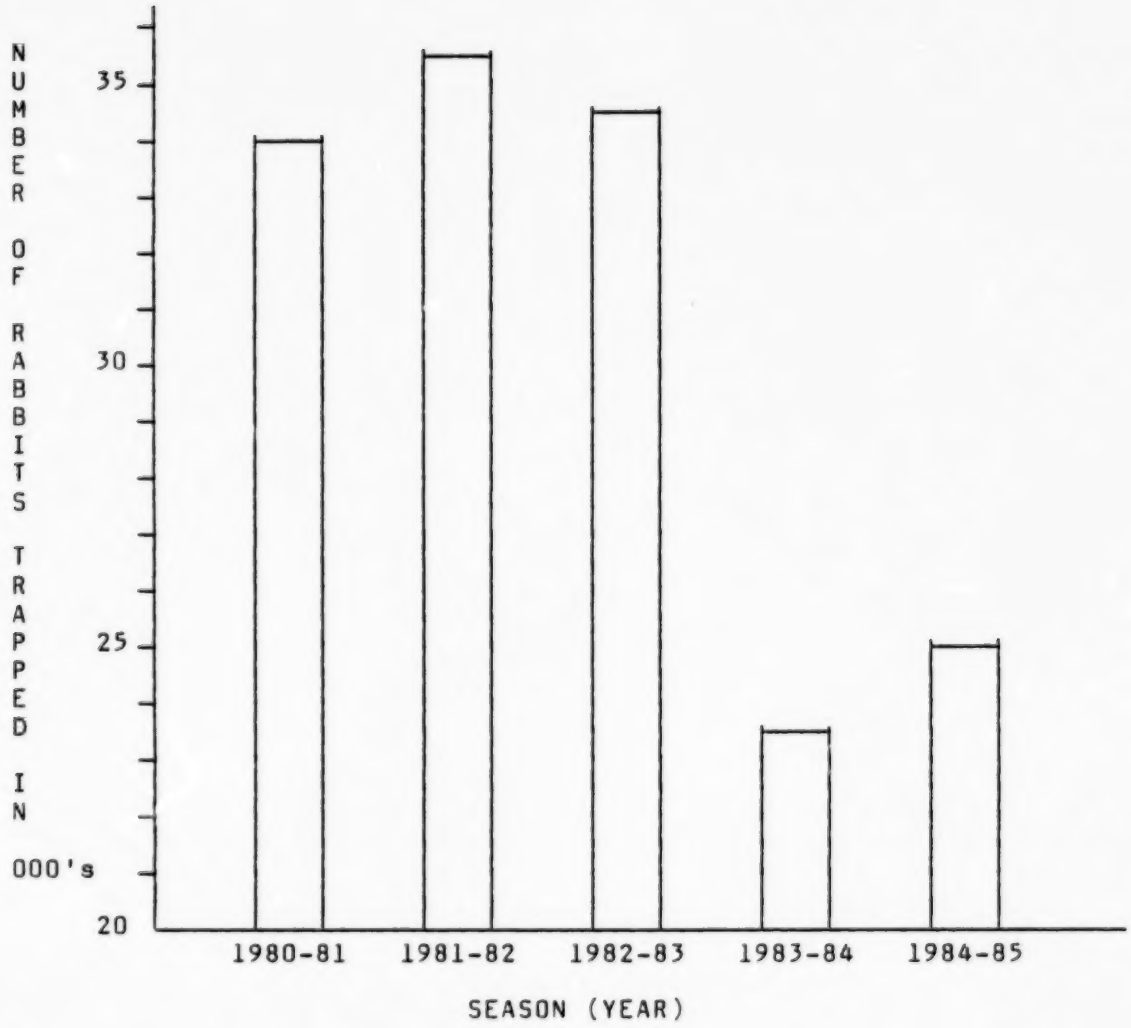

Figure 1 - Estimated Numbers of Rabbits Reported Taken by Trappers Between 1980-1985

APPENDIX

SCARIFICATION CODES

Shark Fin Barrels	01
Disc Trencher	02
Finnish Plow	03
C & H Plow	04
Bracke	05
Crusher	06
Marden Roller	07
Root Rake	08
Herbicide	60
Burn	80
No-site Preparation	99
Other	98
Burn + Bracke	85
Other Combinations	8 or 6 + equipment digit